

acute intestinal obstruction. On physical examination, a mass is very often palpable in the right lower quadrant of the abdomen. The roentgen findings in intestinal tuberculosis are characteristic, but not pathognomonic of the disease. In the ulcerative type, Stierlin's sign is noted. There is irritability, spasm, and localized hypermotility in the involved segment of intestine, and very little barium is retained in this portion of the intestines. In hyperplastic tuberculosis there is constriction and stenosis of the lumen, with obliteration of the normal mucosal markings. Occasionally, filling defects are noted, the appearance of which may simulate carcinoma.

ACTINOMYCOSIS

Actinomycosis of the intestine is often noted in the cecum, and it is present in this location in approximately 25 per cent of all cases. Pathologically, the cecum shows the same thickening as in the hyperplastic form of tuberculosis. Later, suppuration occurs, and the mass is replaced by a number of small abscesses in this region. The disease often spreads to, and perforates, the external abdominal wall, with the formation of chronic draining sinuses. The pus from the discharges contains the characteristic "sulphur granules," in which the ray fungus is demonstrated. Secondary involvement of other abdominal organs, particularly the liver, also occurs. Clinically, these cases must be differentiated from regional ileitis, as this disease is also characterized by persistent abdominal fistulae. In actinomycosis the roentgen examination reveals contraction of the cecum, and filling defects when the process is more advanced. Differentiation from hyperplastic tuberculosis and carcinoma of the cecum is difficult, and the ultimate diagnosis often rests on the demonstration of the ray fungus in the discharges.

AMEBIASIS

Amebic infection of the intestine occurs in two types. In the first, there is an ulcerative colitis of specific etiology which commonly involves the proximal colon. At times, the process spreads and involves the entire colon. Occasionally, there is retrograde involvement of the terminal ileum. The cecum is involved in approximately 85 per cent of the cases. The second type is characterized by the formation of localized granulomatous masses, which are found most often in the cecum and in the flexures of the colon. Gunn and Howard² report three cases of amebic granuloma of the colon, two of which involved the cecum. In this type there is marked thickening of the wall of the intestine, as a result of the large amount of granulation tissue present. Clinically, there is usually a palpable mass in the abdomen. The disappearance of these granulomatous lesions has been observed, after the administration of specific therapy for amebiasis. The symptoms of the ulcerative type are identical with nonspecific ulcerative colitis. Examination of the stools reveals the presence of the vegetative forms or cysts of *E. histolytica*. In the hyperplastic type, diarrhea is often absent, so that carcinoma is usually suspected. The roentgen appearance of amebic colitis is similar to the nonspecific type. The former should be suspected when the process is limited to

the proximal colon. In some cases the roentgen examination of the colon with the barium enema is negative, particularly in the early stage. In other instances, irritability and spasm of the intestines are the only positive roentgen findings. In the hyperplastic type there are filling defects in the barium shadow, the roentgen appearance of which may simulate carcinoma.

(To be continued)

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SELECTIVE ANESTHETIC PROGRAM : ITS DESIRABILITY *

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DISCUSSION by *W. Le Roy Garth, M.D., San Diego; Edwin H. Kelley, M.D., San Diego; Charles F. McCuskey, M.D., Glendale.*

THE proper conduct of the anesthetic is a prime factor in the uncomplicated and successful outcome of surgical treatment together with a carefully planned and executed operation. We are indebted to the pharmacologist and anesthetist for the introduction of many new and efficient agents and improved methods of administration. These have broadened the field of anesthesia, so that a fundamental knowledge of the scope of each is necessary on the part of the surgeon if he is to provide the best agent for his patient. This selection must not only take into consideration the type of surgical treatment contemplated, but also physical, psychic and emotional handicaps. The surgeon has available the consulting or referring physician in evaluating complicating organic disease and emotional reactions of the patient toward the prospective operation. However, just as the physician who recommends a surgeon to the patient takes a definite responsibility in the eyes of the patient and his family, so the surgeon and not the anesthetist is held directly responsible for all details of the surgical procedure. Most patients are informed, in a general way, of the progress of anesthesia and for the most part the type of anesthesia must be discussed and at least tentatively decided upon, together with facts concerning the operation, hospital accommodations, fees and other details of vital interest to him. The relation of patient and surgeon is direct and personal as a result of careful study and discussion of the problems of treatment involved. It is only fair to the anesthetist that the usual impersonal attitude toward his services be corrected and the function of the anesthetist as a consultant be explained, and any suggestions for the betterment or safety of the anesthetic program be communicated to the patient. This, I believe, can best be done on admission of the patient to the hospital by a formal visit and consultation with the

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anesthetist, at which time he should correlate his findings with those listed from physician, surgeon, and laboratory. If he does not agree with the anesthetic program outlined by the surgeon, mutual agreement on the best procedure may be arrived at and preparation commenced without further delay or upset to the patient.

Having long been convinced of the desirability of varying the anesthesia to suit the individual circumstances, I reviewed the types of anesthesia employed in one thousand consecutive major operations in my private practice. This revealed that 9 per cent were given open ether, 25 per cent gas, oxygen, ether series, 11 per cent avertin basal (supplemented usually with nitrous oxid or ethylene and occasionally combined with ether or, in a few instances, with open ether), 9 per cent nitrous oxid alone, 12 per cent with ethylene alone, or a total of 21 per cent with these gases alone; 32 per cent spinal and 2 per cent local, including any other type of regional anesthesia.

With the present latitude of anesthetic procedure and its attendant advantage to patient and surgeon, empiric insistence on one anesthetic procedure by either anesthetist or surgeon is unprogressive. Observation would indicate that anesthetists favor inhalation anesthesia, while surgeons incline toward regional anesthesia where there is no contraindication to its use. However, there should be no divergence of opinion because both have their distinct place.

INHALATION ANESTHESIA

Preoperative medication is routinely used, and I believe that split doses of barbiturates the night before and the morning of operation, with the usual dosage of morphin, or one of the newer derivatives with atropin or scopolamin, is standard procedure.

The proper technical administration of inhalation anesthesia has no interest for the surgeon. It is important for him to be conversant with the four planes of anesthesia, as in the average operation requiring one hour, perhaps only five or ten minutes need be third-plane anesthesia; so that by mutual understanding between anesthetist and surgeon unnecessary and prolonged deep anesthesia may be avoided, with distinct benefit to the patient. Anesthetists, by their use of the intratracheal catheter, have produced quieter and smoother anesthesia for upper abdominal surgical procedures. Likewise, by the use of a basal anesthetic such as avertin difficult upper abdominal procedures requiring adequate anesthesia to perform a careful nontraumatizing operation is very helpful. More recently evipal soluble has been used and has the advantage over avertin of simplicity of preparation and administration with less toxicity. Both, in producing a satisfactory basal state, reduce the amount of supplementary anesthetic by one-third or even one-half. My patients uniformly praise avertin basal anesthesia; and if they have had previous anesthetics are unanimous in their opinion that the onset of anesthesia while lying in bed prior to leaving their room is far superior to any other type of induction. Obviously, this is the method of choice in apprehensive and nervous individuals and the one which I use in this type of patient if possi-

ble. Also, the continued period of analgesia following operation allows these patients, in most instances, to completely recover from any initial pain or shock as a result of the operative procedure before they regain full consciousness.

Even with adequate preparation not infrequently a patient tolerates an inhalation anesthetic poorly. The mistake is made by the anesthetist in delaying the change to a better-tolerated one, it being a matter of pride with some anesthetist that they can anesthetize any patient under any circumstance with one agent or method. It is obvious that it is unwise to push any type of anesthesia beyond its limitations. This particularly applies to the use of gases alone in attempting adequate anesthesia for intra-abdominal procedures. When this is attempted without associated basal anesthesia, the end-result is insufficient relaxation to permit adequate exposure without undue trauma, a poor anesthesia, and a poorly done operation. The worst feature of the anesthesia is the necessity on the part of the anesthetist to increase the concentration of gas in a vain effort to obtain adequate relaxation to the point of resultant cyanosis. There seems to be good evidence that the narcotic action of nitrous oxid is enhanced by some degree of anoxemia. Inasmuch as it must be given in high concentration, the administration is frequently accompanied by cyanosis. It is appreciated that there is a difference of opinion among good anesthetists whether any clinical cyanosis in gas anesthesia is harmful; but as far as my own patients are concerned, I prefer to adhere rigidly with those claiming any degree of clinical cyanosis bad practice and unnecessary to proper administration. My conviction in respect to this point of view has not been lessened by the several reports of severe degeneration of the brain with subsequent death following nitrous oxid and cyclopropane anesthesia. Two recent reports by Gebauer and Coleman,¹ and O'Brien and Steegman,² detail cases of cerebral necrosis with death in the first instance with cyclopropane, and the second, nitrous oxid, in which there was no clinical cyanosis. Courville,³ in discussing the pathogenesis of cerebral necrosis in this connection, points out that the weight of opinion supports asphyxia as the cause rather than any toxic or narcotic action of the gas. Further emphasis of this point is had by a clinical death from this syndrome in my own practice. The patient, an elderly woman, took a very poor nitrous oxid anesthesia, as evidenced by periods of cyanosis subsequent to periods of temporary arrest of respiration. Postoperative clinical evidence of cerebral damage, which, unfortunately, we could not confirm by autopsy, was failure to regain consciousness, muscular twitchings, convulsive seizures, profound restlessness and hyperthermia, death resulting in five days.

The value of these agents has been demonstrated beyond doubt, but the importance of careful administration and a knowledge of their limitation is equally vital to all concerned. The value of versatility and adjustments of agents, or combination of agents or methods, to physical or psychic tolerance on the part of the patient is equally important. The value of basal anesthesia and im-

proved methods of technique, such as the intra-tracheal catheter for upper abdominal, and head and neck surgery, especially in the presence of fire hazards, needs no further comment.

My experience with intravenous agents has been limited to short procedures. It is entirely safe with careful administration, and is of definite advantage because of the prompt return to consciousness without nausea and vomiting. Patients should not be dismissed until entirely recovered or properly attended. Its simplicity makes it very useful for office cases, and its freedom from fire hazard is helpful in cases requiring high-frequency cutting or the cautery.

SPINAL ANESTHESIA

As noted, spinal anesthesia was employed in 32 per cent of cases. It is an established fact that it provides the most ideal conditions for the technical performance of surgical procedures. Further, it is acknowledged to be the anesthetic of choice in a number of surgical conditions, provided there are no contraindications to its use.

Fourteen years' observation of many hundreds of spinal anesthetics provides a knowledge of only two deaths from this agent, one directly due to the anesthetic and the other to coronary thrombosis confirmed at autopsy, possibly precipitated by the anesthetic. No other residual sequelae or complications have come to my attention. It is, therefore, disturbing from time to time to read reports⁴ of clinical changes in the nervous system, and of associated sequelae and complications following spinal anesthesia. If these have occurred in my practice, they have gone unrecognized by the patient and myself. The only conclusion I can reach—if such reports are authentic, which they undoubtedly are—is that gross error in technique must be responsible for their occurrence. Likewise, Davis et al.⁵ reported persistent changes in the structures of the spinal cord of dogs, to which had been administered varying doses of spinal anesthetic agents through a ninety-day period. These changes were given as inflammatory reaction in the leptomeninges, passive changes in the ganglion cells, swelling and fragmentation of the axis cylinders, and degenerative changes in the fiber tracts of the cord.

Although there were no clinical manifestations of such changes in my patients, I felt such findings were a serious indictment of spinal anesthesia and undertook to confirm these histologic studies, using a total of twenty-two dogs. I was not interested in the reaction of the structures in the cord to massive doses of the various agents, but rather the reaction to a comparable dose given man. We were unable to do accurate and atraumatic spinal puncture in the dog, as Davis and his associates so resorted to laminectomy in each instance. Two animals developed wound infections and were discarded and two were used as controls. Six dogs, varying in weight from 8 to 24 kilograms, were given, in the lumbar region, from 15 to 45 milligrams of dissolved novocain crystals, using spinal fluid, and destroyed from four to thirty days, the cords carefully removed and fixed in Muller's solution. A second series of six dogs, varying in weight from 14 to 24 kilograms, were administered by the same tech-

nique amounts of nupercain, varying from 0.4 to 0.7 cubic centimeter, and destroyed at similar intervals. The third group of six dogs, varying in weight from 8 to 45 kilograms, received, by a similar method, doses of from 0.3 to 0.6 cubic centimeter of a mixture of 50 milligrams of novocain and 2 cubic centimeters of nupercain, the cords being removed at intervals, as in the other series. This latter combination was studied because of my interest and report⁶ of its advantage in obtaining faster onset of anesthesia when nupercain was employed. The segments of the cord were treated with Marchi stain for detection of myelin sheath degeneration, and hematoxylin-eosin for general configuration and meningeal examination; Nissl stain for nerve cells and cytoplasmic granules; Bielschowsky silver stain for collagen fibrils, axis cylinder and dendritis; Weirgert-Pal stain for medullary sheath; and Weirgert stain for fibrin and glia fibers. These sections, taken at different levels throughout the cord, were examined by Dr. Earl Meyers, who was associated with me in this work. Any controversial sections were submitted to others for opinion, and it was their combined report that no pathological changes were present in the structures of the cord as a result of these therapeutic doses. It is to be remembered that nupercain is reported to be many times more toxic than novocain, although in the therapeutic doses used, no toxic effects could be demonstrated.

Koster,⁷ using frogs because of the simplicity of injecting the urostyle without trauma, administered sublethal doses of novocain to 528 frogs. These animals were then destroyed from one hour after administration at regular intervals up to one hundred days, and similar histologic studies made of the spinal cord. He noted transitory changes in the structures of the cord, which began to regress in six hours and entirely disappeared in twenty-four hours. In the same report Koster relates the similar examinations of six human spinal cords of patients dying of other causes, following the administration of spinal anesthesia. The time interval following anesthesia in these cases was 22, 36, 96, 144, 192, and 816 hours. In no instance was there any demonstrable histologic change from the normal. Similar confirmation of Koster's findings is to be had in the works of van Lier,⁸ Wassildo,⁹ Babcock,¹⁰ Pitkin,¹¹ and Lundy, Essex and Kernohan.¹²

From clinical observation and histological examination of animal and human spinal cords, we can conclude without reservation that spinal anesthesia is devoid of injury or sequelae if properly administered.

In preparation for spinal anesthesia I use the same combination of drugs as for inhalation anesthesia, with the addition before administration of ephedrin to minimize blood-pressure fall. If it is then advisable to supplement with one of the gases, because the patient objects to the conscious state or the spinal anesthesia is not adequate, this can be done immediately. If it is important or desirable from a surgical standpoint to use spinal anesthesia, one need not fear the combination of inhalation agents for the comfort of the patient at any time during the course of the operative pro-

cedure. The idea that, because patients have had a satisfactory spinal anesthesia, they must endure fatigue, apprehension and psychic trauma through their experience and surroundings is unfeeling. I therefore purposely supplement a large percentage of my spinal anesthetics with narcotic doses of the gases, knowing the patient is comfortable at the same time having the superior effect of the spinal for the surgical problem at hand. In this enlightened age of anesthesia our patients expect, and have a right to demand, comfort and freedom from pain regardless of the surgical condition. In this connection, to those patients to whom I recommend spinal anesthesia, I emphasize the fact that administration is absolutely painless. Therefore, the anesthetist must be thoroughly conversant with principles of spinal anesthesia and perform a painless, accurate and speedy spinal puncture.

The only postoperative morbidity that has been noted following spinal anesthesia is an occasional headache. These, with improved technique, have been reduced to a minimum of late years. As a matter of fact, the incidence of headache is as great, or greater, after inhalation anesthesia, particularly the gases, than following spinal anesthesia. Furthermore, the spinal headache may be relieved immediately by the simple intravenous injection of caffeine sodium benzoate.

SUMMARY

1. The limitations of gas anesthesia are discussed and the hazards of cyanosis and anoxemia stressed.
2. The psychic and practical advantage of rectal basal anesthesia is given.
3. The case for spinal anesthesia is presented and proof of its safety and freedom from sequelae with proper administration detailed.
4. The desirability of a careful individualization of patients in respect to anesthetic agents employed, considering psychic as well as physical status, is the principal theme. The closest coöperation of surgeon and anesthetist to provide maximum comfort to the patient consistent with the best end-result of surgical therapy should be the goal of both.

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DISCUSSION

W. LE ROY GARTH, M.D. (233 A Street, San Diego).—Doctor Holder is to be complimented for having thought enough about this problem to write a paper on the sub-

ject. Many surgeons let habit get the best of them and allow themselves to fall into a rut regarding the proper selection of anesthesia for the individual patient. Anesthetists, themselves, easily develop bad habits in this respect, and should be properly grateful to a surgeon who refuses to let them do so in respect to his patients. However, they must disagree with Doctor Holden when he says that "the surgeon and not the anesthetist is held directly responsible for all details of the surgical procedure." This fallacy dates back, we believe, to the days of technician-administered anesthesia, when the surgeon really did have to superintend the administration of the anesthetic, and when he really did have to take the blame when things went wrong. We contend that the modern physician anesthetist should certainly be expected to relieve the surgeon of most of this burden and, if it comes to a showdown and there is a death on the table, the anesthetist must perforce be held equally responsible, with the surgeon and with the internist, for what has happened.

Regarding the types of anesthesia used in Doctor Holder's one thousand cases, it should be noted that this series extended over a period of several years, and that the proportions of the different types used at present would vary considerably from this list. The principal changes perhaps would be in the rapidly increasing use of cyclopropane, the practical abandonment of open ether, and in a considerable decrease in the percentage of spinal anesthesia used. In place of avertin, sodium evipal is used rectally as a basal anesthetic with increasing frequency.

Doctor Holder's insistence on the avoidance of cyanosis in connection with gas anesthesia has been, I believe, a definite factor in improving anesthesia practice in this locality. Momentarily, at least, cyanosis may be unavoidable, but the deliberate administration of a mixture of gases low in oxygen content should never be tolerated. Fortunately, there has been little temptation to do this since the advent of cyclopropane.

As indicated by Doctor Holder's experiments, and those of Koster and others, the possibility of lasting injury to the spinal cord in connection with spinal anesthesia is extremely remote. So remote, in fact, as to be in a class with the explosion hazard in connection with the use of ethylene and cyclopropane. The open-minded surgeon and anesthetist properly evaluate the slight risk involved in using these agents and methods, as compared with the tremendous advantages obtained, and insist on using them when indicated.

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EDWIN H. KELLEY, M.D. (1205 Medico-Dental Building, San Diego).—Doctor Holder speaks of a formal visit and consultation with the patient on his admission to the hospital and an anesthetic program decided upon. This, we believe, is very important because no one is more aware of the merits and limitations of the various types of anesthetics than is the anesthetist. Past experience has taught him the futility of giving nitrous oxid when cyclopropane is clearly indicated. Furthermore, most patients are more apprehensive concerning the anesthetic than the actual surgery.

We routinely use avertin, evipal or paraldehyd rectally in preoperative preparation. When avertin is used, 80 milligrams or less is given forty-five minutes before surgery, preceded by morphin sulphate, grain 1/6, and atropin, grain 1/150, fifteen minutes sooner. With paraldehyd, one cubic centimeter for every eight pounds of body weight in double the amount of olive oil is given two hours before surgery. One hour before surgery, the hypodermic is given and this consists of morphin sulphate, grain 1/6, and scopolamin, grain 1/150. An advantage of the latter is that the patient is sleepy nearly all day and is unaware of the elimination of the anesthetic agent. Nausea is much less common with this type of procedure. The Navy surgeons, in addition to either of the above methods, give prostigmin, ampoule 1/1 by hypodermic two hours before surgery. As a postoperative procedure they give glycerin, 5 cubic centimeters, by mouth every four hours for five days to prevent distention and supplement this with prostigmin, ampoules 1/1, every four hours for five doses in the most stubborn cases.

We use nitrous oxid only for induction, later changing to cyclopropane or ethylene, unless a cautery or radial knife is used, at which time nitrous oxid is used throughout. An added precaution of removing the ether jar and rinsing the rubber bag on the machine with water before the cautery is used is an aid in guarding against explosions.

Of the intravenous agents, pentothal sodium is preferable to evipal. However, when either is used in the office, not more than .5 gram should be used. Upward of this should be a hospital case. If either of these are to be used at the County Hospital, the patient is admitted for at least twenty-four hours and closely observed during the period following surgery. In one case there, a gunshot wound when the entire lower jaw, half the tongue and glottis were shot away, we used pentothal for three hours and ten minutes. Normal saline was started intravenously and the pentothal injected through the rubber tubing as needed. Nearly four grams were used.

Doctor Holder mentions Doctor Davis, who reported persistent changes in the structures of the spinal cord following spinal injection. We presume he means Loyal Davis, head of the Department of Surgery at Northwestern University. As a result of his experiments on dogs, spinal anesthetics in any form are forbidden in Passavant, the University Hospital. This seems absurd. We do feel a spinal should be given by an anesthetist who has the equipment, gas or carbogen, should the spinal prove ineffective or the surgical procedure carry beyond the time allotted a spinal. Ethylene added to a spinal before the skin incision is made is ideal.

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CHARLES F. McCUSKEY, M.D. (1561 Puebla Drive, Glendale).—Speaking from the viewpoint of an anesthetist, I should like to congratulate Doctor Holder on the variety of anesthetic procedures which he uses. It is certainly a great improvement over the program of many surgeons who adhere to the use of one anesthetic agent and method regardless of the type of operation or physical condition of the patient.

In our own practice, in addition to the variety of procedures enumerated by Doctor Holder, we have found regional block, alone or combined with gas or avertin, of value. Thyroid operations on the exophthalmic type or extremely toxic adenomas frequently do better with avertin plus local than with local alone. Abdominal field block for intra-abdominal operations on patients that appear too sick for spinal or peridural anesthesia will enable the anesthetist to produce sufficient relaxation without resorting to deep surgical anesthesia. Ethylene can be used for these cases without producing cyanosis or the addition of ether, but my own preference is cyclopropane.

It is well to keep in mind that the chief function of the blood is to carry oxygen to the tissues. In the presence of a low hemoglobin the oxygen carrying power is decreased. During spinal anesthesia the tidal exchange may be reduced from 40 to 60 per cent. Such patients should be watched carefully and given oxygen at the first sign of cyanosis.

Proper selection of the anesthetic agent and method of administration to suit the needs of each individual patient will undoubtedly reduce postoperative morbidity by twenty-four to forty-eight hours.

NUCLEUS PULPOSUS RUPTURE: LEGAL-INDUSTRIAL ASPECTS*

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INDUSTRY'S liability, under the California Workmen's Compensation laws, where employees suffer ruptures of the nucleus pulposus, is not yet clearly determined. It will be definitely ascertainable in the future in direct ratio to the development and certainty of medical knowledge of the causes, the necessary treatment and the disabling effects of such ruptures. But it is possible now to state what the probable liability of industry will be under certain circumstances and to point out in this manner the legal problems which are now presented and which will arise in the future.

* Read before the Industrial Medicine and Surgery Section of the California Medical Association at the sixty-seventh annual session, Pasadena, May 9-12, 1938.
Paper by invitation.

ACCEPTED INTERPRETATIONS

Where an employee receives a traumatic injury which in and of itself causes disability without pre-existing disease or degeneration playing any part, the employer is liable for the entire disability resulting and for all medical treatment reasonably required to relieve the disability. But where injury is superimposed on a diseased or degenerative condition the employer is not entirely liable for all disability, but only for the disability attributable to the injury as distinguished from that attributable to disease. An employer is not liable for disability which is not due to industrial injury. He is not liable for disability due to the wear and tear of ordinary life, or to nonindustrial infection, degeneration or disease resulting gradually or immediately merely because such disability occurs while the employee is at work.

However, the law holds that an employer takes a man as he finds him. It does not assume that every employee is a perfect physical specimen. If an individual below par suffers an injury which would not disable a more robust man, and it yet does disable the subnormal individual, the employer is, nevertheless, liable. Thus it is that where industrial injury aggravates a preëxisting disease or a preëxisting diseased condition so as to cause disability, the employer is held liable for such proportion of the disability as is attributable to the aggravation.

AGGRAVATION OF PREEXISTING DISEASE

This liability for disability consequent on aggravation of preëxisting disease must be considered from two standpoints: first, as to temporary disability; and, secondly, as to permanent disability.

During the time the employee is temporarily disabled as the result of the aggravating injury, the employer must pay him compensation for his lost wages. He must also furnish him all necessary medical treatment reasonably required to cure and relieve him of the aggravating effects of the injury. If, then, after all reasonable medical treatment required (because of the injury) has been furnished, the employee has been returned to the same approximate condition as would have existed in absence of the injury, the employer has no further liability.

However, if the injury, superimposed on the pre-existing condition, leaves a lasting or permanent disability greater than would have existed in absence of the injury, then the employee is entitled to monetary compensation for that proportion of his permanent disability attributable to the injury. But he is not entitled to disability benefits for that proportion of any permanent disability he may have which is solely attributable to preëxistent disease uninfluenced by injury.

The liability of an employer to furnish medical treatment is in all cases limited to the furnishing of only such medical treatment as is reasonably required to cure and relieve from the effects of industrial injury.

CLASSIFICATION INTO THREE GROUPS

The foregoing principles take into account three possible classes of cases: